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ENVIRONMENTAL ASSESSMENT BOARD



ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARINGS

VOLUME: 15

DATE: Thursday, May 16, 1991

BEFORE:

HON. MR. JUSTICE E. SAUNDERS Chairman

DR. G. CONNELL Member

MS. G. PATTERSON Member

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ENVIRONMENTAL ASSESSMENT BOARD
ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARING

IN THE MATTER OF the Environmental Assessment Act,
R.S.O. 1980, c. 140, as amended, and Regulations
thereunder;

AND IN THE MATTER OF an undertaking by Ontario Hydro
consisting of a program in respect of activities
associated with meeting future electricity
requirements in Ontario.

Held on the 5th Floor, 2200
Yonge Street, Toronto, Ontario,
on Thursday, the 16th day of May,
1991, commencing at 10:00 a.m.

VOLUME 15

B E F O R E :

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DR. G. CONNELL Member

MS. G. PATTERSON Member

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I N D E X o f P R O C E E D I N G SPage No.

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1 ---Upon commencing at 10:02 a.m.

2 THE REGISTRAR: This hearing is now in
3 session. Please be seated.

4 Mitchell Pierson Rothman,
5 Paul Jonathan Burke,
6 Lily Buja-Bijunas; Resumed

7 THE CHAIRMAN: Mr. Campbell.

8 MR. B. CAMPBELL: Mr. Chairman, if I
9 could raise a brief administrative matter with you. We
10 have been trying to produce transcript undertaking
11 responses and what I would like to suggest, having
12 spoken to a few of the other counsel and to Ms.
13 Morrison, is that we reserve one exhibit number now,
14 and we will feed all of the transcript undertaking
answers into that exhibit number.

15 THE CHAIRMAN: For Panel No. 1?

16 MR. B. CAMPBELL: For Panel 1. And then
17 we would, I am going to suggest to Mrs. Formusa, who
18 will be calling Panel 2, that at the beginning she get
19 an exhibit number for those matters and then we can
20 deal with this as they come up.

21 It can be mentioned in the transcript all
22 right, that will be added to exhibit such and such,
23 which I will tell you will have the practical result of
24 making these things an awful lot easier to find in the
25 transcript.

1 THE CHAIRMAN: So if the next exhibit
2 number is 134, it will be 134.1, .2, .3, .4, and so on,
3 something like that?

4 MR. B. CAMPBELL: Yes, something like
5 that. So that if we could do that.

6 Then, what we will do is keep track of
7 the ones for Panel 1, and we will put a number on each
8 one as it comes in. We have, I think, eight or nine
9 ready to go now. But I would like to have some
10 systematic way of doing it.

11 When we provide the information, we are
12 putting a cover sheet on that says the party in
13 relation to which the undertaking relates, and gives
14 just a very brief description and a transcript
15 reference, so that you will have a complete set of
16 information.

17 If I could reserve the next exhibit
18 number, then, as we do this, I will make sure they are
19 filed under that exhibit number.

20 THE CHAIRMAN: And there is no problem
21 about that, in recording it and storing it and so on?

22 MS. MORRISON: No problem.

23 THE CHAIRMAN: Any party have any
24 difficulty with that suggestion? (No response)

25 What's the next exhibit number?

1 THE REGISTRAR: 134.
2 THE CHAIRMAN: It will be 134.
3 MR. B. CAMPBELL: 134. And it will be--
4 THE CHAIRMAN: Lucky guess. (Laughter)
5 MR. B. CAMPBELL: --responses to the
6 Panel 1 undertakings.

7 ---EXHIBIT NO. 134: Reserved for responses to Ontario
8 Hydro Panel 1 undertakings.

9 THE CHAIRMAN: All right.
10 Ms. Couban.
11 MS. COUBAN: Thank you, Mr. Chairman.
12 Before I begin my cross-examination, I would like to
13 fulfil an undertaking that I gave to the Board that
14 arose during Mr. Harry Poch's cross-examination. And
15 that was an undertaking with respect to the start date
16 of certain Ministry of Energy programs.

17 I now have that information. I have
18 distributed copies to the clerk and to my friends, so
19 perhaps we should enter that as an exhibit, Mr.
20 Chairman.

21 Together with that sheet of paper with
22 the start dates of the programs, I have a package from
23 the Ministry of Energy which is a public information
24 package explaining the programs which Mr. Poch referred
25 to.

1 I have copies and I have distributed them
2 to my friends. If it would be useful, we could also
3 enter that as an exhibit.

4 THE CHAIRMAN: Why don't we enter it
5 collectively as one exhibit, Exhibit 135?

6 ---EXHIBIT NO. 135: Response to undertaking given to
7 Board by Ms. Couban, representing the
8 Provincial Government Agencies, as
9 requested during City of Toronto's
10 cross-examination, namely, start dates of
11 Ministry of Energy programs, plus
12 Ministry of Energy public information
13 package explaining those programs.
14

15 MS. COUBAN: Thank you, Mr. Chairman.
16 I have taken some pains, Mr. Chairman, to ensure that
17 my questions have not yet been asked. Although they
18 are in areas that have been covered before, I believe
19 the specific questions I will be asking have not yet
20 been asked.

21 For your information --

22 THE CHAIRMAN: You can't be sure you
23 won't get the same answers, though?

24 MS. COUBAN: True. And I can't be sure
25 that they haven't been asked yet.

26 MR. B. CAMPBELL: It is another version
27 of question 431, just refer to answer 621.

28 MS. COUBAN: For the panel's assistance,
29 I have given this information to the witness panel

1 ahead of time. I will be referring to Interrogatory
2 1.6.38, which was in Exhibit 101, which was the package
3 of interrogatories used in direct evidence by Mr.
4 Campbell.

5 I will also be referring to Interrogatory
6 1.32.1, which is a government interrogatory of which I
7 have distributed copies to the Clerk. And Exhibit 100,
8 Pages 11 and 12. And I will also be referring to some
9 transcript references in Volumes 2, 3, 8, and 11.

10 THE CHAIRMAN: Did you say that you
11 circulated the government interrogatories? Did you say
12 that?

13 MS. COUBAN: Yes, I have, Mr. Chairman.

14 THE CHAIRMAN: Do we have those?

15 ---Off the record discussion.

16 CROSS-EXAMINATION BY MS. COUBAN:

17 Q. The first area I would like to begin
18 with, Panel, is with respect to the external advisory
19 committees, or the external review committees, which
20 you have referred to.

21 I believe you have told us that Ontario
22 Hydro consults an external advisory or review committee
23 with respect to its economic outlook and also with
24 respect to its load forecast.

25 I believe you have also told us that you

1 consult the external committee with respect to the
2 question of the uncertainty bandwidth; is that correct?

3 MR. ROTHMAN: A. We have separate
4 advisory committees for the economic forecast and the
5 load forecast. I think their membership is distinct,
6 although I think there may be one or two people who are
7 on both committees.

8 We have not consulted them directly about
9 the bandwidth. We have presented the bandwidth to the
10 load forecast advisory committee and perhaps Mr. Burke
11 can elaborate on that.

12 MR. BURKE: A. I think, maybe, what you
13 are referring to, though, is that we did ask the
14 economic advisory committee, essentially, to answer a
15 question, each of them, which was related to what they
16 would perceive to be the 10 per cent, 50 per cent, and
17 90 per cent points for economic growth from the current
18 year, through to 2000 and 2010. And that was done in
19 1988 and then again in 1990.

20 So that is something where we have asked
21 the same people a question that was useful in
22 developing and checking the uncertainty band.

23 Q. I believe you have also told us that
24 you want a broad range of interests to be represented
25 on those committees and also you wanted people who

1 would talk or who would contribute to the discussions;
2 is that correct?

3 MR. ROTHMAN: A. Yes.

4 Q. Could you tell us who specifically
5 chooses the members for those committees?

6 A. I can tell you for the economic
7 forecast advisory committee. There is an analyst in
8 the division who essentially takes last year's list,
9 and he and the manager of the economic forecast section
10 go over it and decide whom they think they would like
11 to invite again.

12 And then they come to me and say, 'Is
13 there anybody on this list that you don't think should
14 be there, or anybody whom you want on this list who
15 isn't there?' So, it's, essentially, recommended to me
16 by the section head of the economic forecast section,
17 and I add to it or delete from it, maybe, a few names.
18 And that's where the list comes from.

19 Q. And is that the same process with
20 respect to --

21 MR. BURKE: A. It's pretty well the same
22 process for the load forecast. We really have tried to
23 include a wide range of people. I think there is some
24 restriction, perhaps on geographical distance; that is,
25 we haven't particularly brought in people from the West

1 Coast, say, to Toronto meetings for a day, but we have
2 even considered that, though, in case of one professor
3 from the University of British Columbia, but we have
4 focussed on people in Ontario.

5 Q. Are minutes of those meetings kept?

6 MR. ROTHMAN: A. The subject of minutes
7 of those meetings is a little tricky because we do have
8 representatives of, for example, the Ontario Ministries
9 of Treasury and for the Load Forecast Energy, and the
10 National Energy Board, who have at least some
11 regulatory or other relationship with Ontario Hydro.
12 And so, while they are happy to attend the meetings and
13 offer us comments, they would not like to be seen as
14 endorsing our forecasts in any way.

15 What we do keep are records of the
16 conversations, and we have sometimes written those up
17 in general form, and sent them back to the participants
18 without identifying individuals with particular
19 comments.

20 Q. I believe that you have also told us
21 that after the consultation with the external
22 committees, Ontario Hydro does an internal review. And
23 there are a number of other steps before it takes the
24 final product to the Ontario Hydro Board of Directors.

25 Is that substantially correct?

1 MR. BURKE: A. I guess that applies to
2 the load forecast.

3 Q. Yes.

4 MR. ROTHMAN: A. The load forecast goes
5 to the board of directors; the economic forecast does
6 not.

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1 [10:15 a.m.] Q. I'm sorry, I was referring to the
2 load forecast.

3 How do you address or take account of
4 concerns or issues that have been raised by the
5 external committee when preparing the load forecast for
6 presentation to the Ontario Hydro board?

7 MR. BURKE: A. Well, the external load
8 forecast advisory committee occurs -- the board
9 presentation is the second week of December, and the
10 presentation to the internal load forecast advisory
11 committee, I guess, is about two weeks after the
12 external, and then followed, a week or two later, by
13 presentation to the executive office.

14 In that intervening time where criticisms
15 have been made that we feel we should incorporate into
16 our forecast, we do. I suppose if the criticism was
17 the whole forecast should be sort of -- should start
18 again, I am not sure how we would respond to that in
19 the time available. But it hasn't happened that way so
20 far.

21 In general, the comments have been very
22 favourable about our forecast and specific areas have
23 been highlighted as question marks that we should look
24 into. And at times we have, in fact, made changes
25 between the draft material we send to the external

1 people before it gets to the internal review.

2 Q. Can we deal with a few specific
3 concerns which I am advised were raised by the external
4 advisory committee, and see if you dealt with some of
5 those concerns?

6 If we could start with, firstly, Exhibit
7 100, page 11, which is a graph dealing with retail
8 lighting efficiency and utilization. I am advised that
9 this chart was presented to the load forecast external
10 advisory committee on October 31, 1990. Do you recall
11 this graph being presented to that committee?

12 DR. BUJA-BIJUNAS: A. A graph very
13 similar to it was presented. We did make some
14 fundamental changes in the efficiency assumptions for
15 lighting, due to some comments from the external
16 advisory committee. So we did have a retail lighting
17 graph similar to this, but the efficiency assumptions
18 have been increased.

19 Q. Okay. Because my question was, do
20 you recall that a number of people queried the forecast
21 of increasing utilization and asked where the evidence
22 was to support such an increase? My question was going
23 to be to you, did you take account of those questions
24 or concerns raised in that meeting, and if so, how?

25 A. Actually, there were two areas which

1 they raised, one was utilization, one was efficiency,
2 both aspects that go into energy use.

3 We went back and discussed both areas
4 with the energy management branch, in terms of what
5 they thought regarding those particular comments, given
6 that they have been involved in audits, et cetera, of
7 the commercial sector, and in addition to discussions
8 with other utilities in the northeast regarding these
9 assumptions. As a result, we left the utilization for
10 the retail lighting areas the same as it was before.
11 We increased the efficiency assumptions beyond what was
12 in there when we went into the external advisory
13 meeting. So, the comments were taken into
14 consideration, other people were contacted, and we did
15 reformulate some of those assumptions.

16 Q. Specifically, what is the evidence
17 behind the forecast that shows, during the period 1986
18 to 2015, that retail lighting utilization is increasing
19 faster than efficiency?

20 A. Basically, it was, there is no hard
21 evidence in terms of documented numbers. It was more
22 in line with discussing with individuals who were
23 dealing with the commercial sector or other utilities
24 that had strong commercial growth, that their
25 observation was that due to flexible work hours, for

1 example, there was an extension of the number of hours
2 that retail outlets were opened and that is what that
3 utilization refers to: Increased operating hours
4 consistent with demographic trends, consistent with the
5 fact that people have extended their work day and,
6 therefore, extended their shopping day as well.

7 DR. CONNELL: Could I just clarify the
8 meaning of the graph? Does the blue line show the
9 energy consumption that would be expected if there were
10 no change in efficiency?

11 DR. BUJA-BIJUNAS: No. What the blue
12 line shows is the net impact of utilization increases,
13 meaning the net impact of increasing operating hours
14 and factors like that; factors that are distinct from
15 the technology itself that provides the lighting.

16 So, in 1985, the relative value is one,
17 in 2015, I think it increases by 13 per cent or so,
18 meaning that the net effect of increased operating
19 hours would be to increase the kilowatthour per square
20 foot of lighting by 13 per cent.

21 DR. CONNELL: That would be using current
22 technologies throughout the period?

23 DR. BUJA-BIJUNAS: That's right. And
24 then the red line says, but offsetting that is the fact
25 that you are going to 34 watt, T8's, et cetera, and

1 that would decrease the kilowatthour per square future
2 by whatever that percentage is, 2015 versus 1986.

3 DR. CONNELL: Thank you.

4 THE CHAIRMAN: Well then, how do you
5 reconcile the two lines for your forecast purposes?

6 DR. BUJA-BIJUNAS: What it means is that
7 if, for example, the efficiency impact decreases the
8 kilowatthour per square foot by 15 per cent, and
9 utilization increases by 13 per cent, the net effect is
10 that the kilowatthour per square foot decreases by 2
11 per cent.

12 THE CHAIRMAN: So you have, in effect,
13 taken an average of the two lines?

14 DR. BUJA-BIJUNAS: They are offsetting.
15 It's a percentage increase in the ratio and a
16 percentage decrease in the ratio.

17 If they both have the same impact, for
18 example, the net result would be that your intensity
19 would remain constant. If utilization exactly balanced
20 efficiency improvement, you would have the kilowatthour
21 per square foot the same throughout the forecast, or if
22 one were larger than the other by a certain percentage,
23 that percentage would impact on the intensity.

24 THE CHAIRMAN: But there are other
25 factors that impact on intensity as well, I take it?

1 DR. BUJA-BIJUNAS: You can take all the
2 factors that impact on the intensity and either call it
3 an efficiency effect or utilization effect.

4 A lot of the other factors are buried in.
5 For example, turnover, how long a lighting system is in
6 place, that would dictate the turnover rate and,
7 therefore, the rate at which a more efficient
8 technology can come into use, within a given sector.
9 That is buried into the efficiency parameter. So there
10 are a lot of other considerations, but you can
11 basically group all of those into --

12 THE CHAIRMAN: And that has been done in
13 these two lines, I take it?

14 DR. BUJA-BIJUNAS: Yes.

15 THE CHAIRMAN: So everything is in these?

16 DR. BUJA-BIJUNAS: That's right.

17 THE CHAIRMAN: And they are offsetting
18 trends?

19 DR. BUJA-BIJUNAS: For the retail sector,
20 that is correct.

21 THE CHAIRMAN: Which is part of the
22 commercial sector?

23 DR. BUJA-BIJUNAS: That's right, that's
24 right.

25 MS. COUBAN: Q. Did the possibility of

1 Sunday shopping in Ontario have anything to do with
2 this graph's increasing utilization in the retail
3 lighting sector?

4 DR. BUJA-BIJUNAS: A. What we were
5 aiming towards was a certain increase in the number of
6 hours, and we thought something in the order of, I
7 believe, eight hours by the year 2015, given how far
8 away that was, seemed reasonable. In other words,
9 eight additional operating hours for the retail sector
10 per week. You can either translate that into a Sunday
11 opening or you can translate into a couple of hours at
12 the end of each normal Monday to Friday. Whichever way
13 you look at it, it translates into eight additional
14 operating hours per week.

15 Q. Dealing with another example of
16 concerns that I am advised were specifically raised at
17 the external advisory committee, if we can turn to page
18 100, page 12, which is a graph dealing with average
19 fuel shares for space heating offices.

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21
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1 [10:25 a.m.] The graph - and correct me if I am
2 wrong - shows that electricity will have almost half
3 the fuel share by the end of the period; that is, that
4 the average electricity share for office space heating
5 will increase from 28 per cent in 1985 to 48 per cent
6 in 2015; is that correct?

7 A. Could I have those figures again?

8 Q. Sure, 28 per cent in 1985, to 48 per
9 cent in 2015?

10 A. Okay. That is fine.

11 Q. Okay. I am advised that concerns or
12 questions were raised at the external advisory
13 committee by the gas companies as to this apparent
14 trend. Do you recall that those concerns were raised?

15 A. That's correct.

16 Q. And did you consider those concerns;
17 and if so, how?

18 A. Yes. We recognized that the marginal
19 shares for electric space heating for the office sector
20 are quite high; however, we went back to the various
21 sources of information that we have been using.

22 CANADATA, for example, gives the fuel shares for all
23 new construction for offices. In actual fact, CANADATA
24 has a much higher fuel share than even what we use for
25 electricity for space heating in offices.

1 We looked at, again, what other areas
2 with heavy commercial space were having, and it always
3 comes down to the same thing: There are certain
4 features which electricity offers the office segment
5 when it comes to space heating that are attractive to
6 office developers. And because of that, there
7 certainly does seem to be a tendency to go towards
8 electricity as a space heating option in offices.

9 But yes, we recognize, and we have always
10 brought that up during the externals, because of these
11 high fuel shares when we go back to our source of
12 information, the assumptions that we use are certainly
13 not on the high end of some of the information we have.
14 There are sort of in the middle and conservative.

15 Q. In terms of how the process works
16 with these external committees, when concerns are
17 raised and you have satisfied yourselves that those
18 concerns aren't valid, do you go back to the people who
19 raised those concerns, and so advise them?

20 A. We don't, except in a very informal
21 sense.

22 MS. PATTERSON: Just on this question,
23 Doctor, it seems that you have told us that, for
24 offices, there is an advantage to electricity because
25 it is cleaner and more controllable; it can be

1 individually metered, et cetera. But is it also a
2 capital-cost question, as in the residential sector?

3 DR. BUJA-BIJUNAS: That is part of it,
4 too. Certainly, with baseboards, capital cost, no
5 doubt about it, is much lower; also the cost in terms
6 of installation. With electric space heating, the
7 contractors can piggyback on a lot of electrical
8 conduits, that are being put in, anyway, for other
9 purposes. So they like to install it because it is
10 easier; that lowers labour costs and installation
11 costs, et cetera. So there is some cost advantage to
12 doing it that way.

13 MS. COUBAN: Q. Moving on to another
14 area, electricity --

15 THE CHAIRMAN: Just before we leave it,
16 that must be the main thing, must it not, because most
17 of these premises are landlord/tenant/owner
18 relationships. And if the tenant were making the
19 choice, they would go for natural gas - I am putting it
20 very simply - because of the price difference.

21 DR. BUJA-BIJUNAS: A lot of this
22 decision-making comes down to who is paying which bill.
23 And if a developer is paying the upfront capital-cost
24 bill, that is really important for the developer. If
25 the tenant is paying the operating cost, that is really

1 important to the tenant.

2 So, the person using it and the person
3 installing it are often two different people.

4 THE CHAIRMAN: So it is sort of a split
5 choice? I mean, it is not a pure choice of fuel
6 preference here?

7 DR. BUJA-BIJUNAS: In essence, that's
8 correct.

9 MR. BURKE: Although, I might add, it is
10 difficult to know whether a tenant would prefer to pay
11 his own bill or share the bill for the entire building.
12 If the tenant was one who wasn't using much energy,
13 they might prefer to be individually metered, and other
14 tenants might prefer to be part of the total building.

15 MS. PATTERSON: But in office buildings,
16 are they individually metered for electricity, or do
17 they pay a square footage rate?

18 DR. BUJA-BIJUNAS: I think it is
19 dependent on the particular building.

20 But the issue that Mr. Burke just brought
21 up, multi-residential units are in the commercial
22 sector, and the point he just raised is quite true; a
23 lot of condominium units now come with dishwashers,
24 jacuzzis and all sorts of appliances.

25 And the more that is happening, the more

1 people want to pay their individual bills, as opposed
2 to something that is more averaged out, because some
3 individuals might want to take full advantage of all
4 these particular hot-water-using appliances and others
5 do not. So, there is this push towards individual
6 metering; this push towards everybody pays for their
7 own particular use.

8 THE CHAIRMAN: There is the recent policy
9 or direction, or whatever it is, of the City of Toronto
10 or Metropolitan Toronto - I am not sure which, or maybe
11 it is the Government of Ontario - for subsidized
12 housing. And that is something, I think you said, you
13 are going to take into account when you do your next
14 forecast. But that might indicate or would it, in your
15 view, perhaps a trend of some sort of government
16 intervention into this area?

17 DR. BUJA-BIJUNAS: It certainly indicates
18 government intervention in the area, and it results
19 from the very nature of the way subsidized programs
20 were set up, historically.

21 Builders had to produce units that were
22 inexpensive. They had to come in at a certain cost per
23 unit. And naturally, what you end up doing is going to
24 baseboards, because the cost per unit ends up being
25 quite low. So I guess I would say, the system was such

1 that it would naturally evolve to be the case.

2 Plus the other issue is that, with
3 baseboards, you have a non-central system. And one of
4 the pushes towards a central system is air
5 conditioning. And you don't usually have a lot of
6 subsidized housing with central air-conditioning
7 systems which would go with a gas system, for example,
8 putting in all the duct work required. And so
9 everything just seemed to push towards installing an
10 inexpensive baseboard system.

11 MS. PATTERSON: But I guess the follow-up
12 question is whether or not there might be a trend to
13 government intervention in the office sector away from
14 electricity?

15 DR. BUJA-BIJUNAS: I can't predict that.
16 There could. I can't predict that.

17 THE CHAIRMAN: I think you told Ms. Spoel
18 yesterday that you have done no studies of this, if
19 there were a significant shift in the areas where gas
20 was available to natural gas as opposed to electricity?

21 DR. BUJA-BIJUNAS: What we have done is
22 we have looked at the scenario of all-new, either
23 residential or commercial construction, picking up gas
24 as a space-heating alternative as opposed to
25 electricity.

1 That is a more rash assumption, that no
2 one would pick up electricity as a space-heating
3 option; they would all go to gas, which assumes 100 per
4 cent gas availability to allow that sort of thing to
5 happen. And so we have looked at what impact that
6 would have on the load forecast. So we do look at
7 these various scenarios.

8 THE CHAIRMAN: Well, I thought you told
9 Ms. Spoel that you hadn't done that. Perhaps my
10 recollection isn't correct.

11 DR. BUJA-BIJUNAS: No, we hadn't done her
12 particular assumption. I told her that we did look at
13 the extreme-bound scenario, which is all-new does not
14 choose electricity, it goes towards natural gas. But
15 her question more in line with--

16 THE CHAIRMAN: With the availability --

17 DR. BUJA-BIJUNAS: --a particular
18 percentage, 25 per cent of new.

19 THE CHAIRMAN: That seems perhaps offhand
20 more realistic, because we know that gas isn't 100 per
21 cent available across Ontario. And I think your view
22 is that it isn't likely to get any more available in
23 your period of forecasting.

24

25

...

1 [10:34 a.m.] DR. BUJA-BIJUNAS:. Yes. But the net
2 result is that you can get the figure as it came up.

3 In the residential sector, 38 per cent of
4 new homes choose electricity as a space heating option.
5 And we have the load forecast with that particular
6 assumption, and we have the figure for how many
7 terawatthours that entails. It is only 25 per cent
8 instead of 38 per cent.

9 As a rough back-of-the-envelope
10 calculation, you could take 25/38ths of that terawatt
11 hour figure and see what the impact is.

12 So, in essence, all the numbers are in
13 the exhibits because you have that number, the
14 terawatthour number, for the 38 per cent share, and you
15 can just prorate it down by whatever share it is that
16 you are assuming.

17 THE CHAIRMAN: Sorry, Ms. Couban.

18 MS. COUBAN: It's okay. Thank you.

19 Q. If I could move on to the area of
20 electricity price forecasts. Isn't it true that
21 Ontario Hydro's 1988 and 1989 electricity price
22 forecast, for the all-customer average rate, projected
23 decreases in real rates over the period 1990 to 2010?

24 MR. ROTHMAN: A. At that time there was
25 a forecast of a decrease in real rates, or a

1 projection, I think is what they call it, of a decrease
2 in real rates. I don't know that there was as specific
3 a statement as the all-customer average rate, but there
4 may have been.

5 Q. I believe it's in Exhibit 12, in the
6 retail energy price trends annual review.

7 A. Okay.

8 Q. And I believe that it was referred to
9 as the all-customer average rate. So I take it your
10 answer is, yes, that there was a projected decrease?

11 A. Yes.

12 Q. Isn't it also true that the November
13 1990 electricity price forecast projects an increase in
14 real rates for the same period of 1990 to 2010?

15 A. Yes.

16 Q. And do you know what the difference
17 between the '89 and the 1990 forecast was?

18 Approximately?

19 A. This was not a forecast that we
20 compiled. It is a forecast that comes from the
21 financial planning and reporting division. They
22 compile it with cost data from other divisions, so the
23 changes were both in identified cost data, and I
24 think - to be sure you would have to ask them - I think
25 that they had also included some unspecified costs

1 later in the period that hadn't been directly
2 identified, but that it was felt that some such costs
3 would be likely to arise.

4 Did you mean what the change was, in
5 terms of numbers, or did you mean what caused the
6 change?

7 Q. No, no, I meant what the change was
8 in terms of numbers. If you can give me a percentage?

9 A. Sorry.

10 Q. That's okay.

11 MR. B. CAMPBELL: I thought we had given
12 that percentage, if not in direct, certainly, it has
13 come up several times is my recollection.

14 MS. COUBAN: It may have, Mr. Campbell;
15 if it has, I'm sorry I've missed it.

16 MR. BURKE: Roughly speaking, the decline
17 in real terms, the 1989 electricity price which you are
18 referring to, was about 8 per cent by the end of the
19 forecast period. And I think the current forecast is
20 roughly plus 25 per cent in real terms, by the end of
21 the forecast period. So I think it is approximately a
22 33 per cent real increase in electricity prices--

23 MS. COUBAN: Q. Okay.

24 MR. BURKE: A. --that was forecast by
25 the corporation.

I just want to say that we did not use the corporation's official forecast in '89 for the load forecast. We kept the price at zero real in the 1989 load forecast, so the price change that is incorporated in the 1990 load forecast versus the '89 load forecast is only the 25 per cent that I just mentioned.

MR. ROTHMAN: A. There is, as I assume you have already seen - I assume from your questions you have already seen - a summary table in the document, the energy price trends report on page 2, which summarizes the difference between successive forecasts, this forecast and the 1989 forecast, and gives the numbers there in terms of real differences in price.

Q. That's right. That's what I was referring to.

DR. CONNELL: What exhibit number, please?

MS. COUBAN: Exhibit 12, I believe.

MR. BURKE: 14.

MS. COUBAN: Q. My question is, why did the 1990 load forecast go up, compared to the DSP forecast, despite this much higher price projection?

MR. BURKE: A. There is an interrogatory - I believe it is 1.7.35; I can check that number - which does a detailed comparison of the

1 major input assumptions to the three load forecasts
2 '88, '89, and '90, and the major difference is an
3 increase in GDP forecast.

4 If you are looking at driving variables
5 which in itself, through the income elasticity that the
6 forecast has, pretty well offsets the effect of price
7 changes. But, as that response also indicates, there
8 were changes in the models themselves between 1988, '89
9 and '90, and these changes tended to, if we had used
10 the same assumptions, result in slightly higher
11 electricity demand per unit output than -- per unit of
12 GDP, I mean, than previously. So, the price effect is
13 one consideration, but it certainly didn't dominate the
14 forecast.

15 The GDP change, I might add, was largely
16 due to an increase in immigration, which was one of the
17 changes recommended at one of our external advisory
18 committees, I think particularly by the Ministry of
19 Energy.

20 Q. I would like to ask you a few
21 questions about your natural gas price forecast. Can
22 you confirm that natural gas prices dropped 28 per cent
23 from 1988 to 1990?

24 MR. ROTHMAN: A. The forecast or the
25 actual prices?

1 Q. The actual prices.

2 A. That sounds reasonable enough. Let's
3 accept that, subject to check.

4 Q. Okay.

5 A. That document that we are talking
6 about certainly has that information in it. And
7 Ontario average wholesale price, table 6 on page 33 of
8 that document, suggests cumulative price drop in 1988
9 and '89 of about 40 per cent for the Ontario average
10 wholesale price for natural gas. The residential
11 sector retail price drop of somewhat less than that.

12 Q. So you think 28 per cent is too low a
13 figure?

14 A. Since the deregulation of the natural
15 gas market, it is hard to know what single price to
16 take for natural gas. This average wholesale price
17 includes the effect of prices at the retail level and
18 the effect of the ability of some customers to make
19 direct contracts of various kinds with gas producers
20 and suppliers.

21 So, what this shows is about a 41 per
22 cent drop in the Ontario average real wholesale price.
23 It shows about a 32 per cent drop in the average price
24 in nominal terms for the average wholesale price. So
25 28 per cent is about right in nominal terms; but if you

1 take into account inflation you add about another 10
2 per cent on that, so you get about 40 per cent in real
3 terms.

4 Q. Okay. Isn't it true that the 1990
5 actual price forecast for natural gas was 32 per cent
6 below what Ontario Hydro forecast it to be in 1988?

7 MS. PATTERSON: What is the percentage
8 again?

9 MS. COUBAN: 32 per cent.

10 MR. ROTHMAN: The 1988 energy price
11 trends report is also filed, and this has the average
12 wholesale price in current dollars, as forecast in
13 1989; this similar average wholesale price series in
14 1988 forecast for -- what year were you taking?

15 MS. COUBAN: Q. 1990.

16 MR. ROTHMAN: A. 1990.

17 Q. Actual price forecast.

18 A. The 1990 price forecast was for \$3.75
19 per thousand cubic feet. And the November 1990
20 document suggests that it was 258 -- I don't have in
21 front of me here the actual but that's about 30 per
22 cent below the forecast.

23 Q. Now isn't it true that your November
24 1990 forecast projects approximately a doubling of real
25 prices for the 1990 to 2010 period?

1 A. A doubling in real terms, yes.

2 Q. Yes, in real terms.

3 My question to you is, how confident are
4 you that the current natural gas price forecast is
5 reasonable, given that it dropped 28 per cent or
6 thereabouts from 1988 to 1990, and yet you're
7 forecasting a doubling in real prices for the next 20
8 years, from 1990 to 2010?

9 A. There are two factors that I think
10 account for the drop in the short term; they are
11 interrelated. One is an existing surplus of gas
12 capacity in Alberta and existing and surplus gas in
13 Alberta.

14 The other is exacerbated by the cyclical
15 downturn that we experienced in 1989 -- well, in 1990.
16 We saw a decrease in electricity demand in the year
17 1990. I don't have the numbers off the top of my head
18 but I would be very surprised if there weren't a
19 decrease in natural gas demand in Ontario also in 1990.
20 In a deregulated environment, the obvious response to
21 increase supply and decreased demand is a lower price.

22 ...

23

24

25

1 [10:50 a.m.] So, the greater-than-expected price drop
2 in 1990 isn't a big surprise for those cyclical and
3 short-term reasons.

4 When we look at the medium-to-longer term
5 future for the natural gas market, I think there is a
6 somewhat different story. There are now approved, and
7 will be under construction, new pipelines to supply
8 Canadian gas to the United States market. There are
9 also significant new proposals for electricity
10 generation using natural gas in both the United States
11 and Canada.

12 So, there is reasonable expectation that
13 the demand for natural gas will increase in Canada as a
14 result of the economic recovery that we expect after
15 this cycle as a result of an increased use of natural
16 gas for electricity generation. And we expect an
17 increase in natural gas demand in United States, again,
18 for cyclical reasons, and for increases in electricity
19 generation.

20 The increase in demand in both
21 jurisdictions will be important for Canada because,
22 with the new pipelines, the North American natural gas
23 market is becoming increasingly integrated. Canadian
24 gas consumers will have to be competing, in effect,
25 with U.S. gas consumers for the same gas.

1 So put together, that suggests that this
2 excessive supply that now exists will be used up by
3 these natural increases and new uses of natural gas.
4 As that happens, in order to meet the demand, new
5 supplies will have to be found and the new supplies
6 that will have to be found will be more costly to find
7 and to bring into production than our existing
8 supplies.

9 So that is a fairly lengthy answer, but
10 I think it gives a picture of why it is that I am
11 reasonably confident in the forecast of an increasing
12 real natural gas price.

13 These price increases are not startling.
14 Our price level, if you go back to table 6, of Exhibit
15 14, you look at the average wholesale price in Ontario
16 in the year 2010 is \$5.20. That's equal to the
17 wholesale price in real terms in Ontario in 1985 and
18 below that of the period of 1982 through '84.

19 So we are not talking about gas prices
20 here getting into stratospheric levels. We are just
21 saying there will be some gradual real increase in
22 natural gas prices in response to these conditions of
23 supply and demand.

24 In addition, I think if we look table 7
25 on page 29 of the 1988 energy price trends report, you

1 will see that the price forecast there for the year
2 2010 is \$5.43 then in 1988 dollars, which is above, but
3 not much above, the current price forecast. So we
4 haven't changed that price forecast very much over
5 these last two years, that long-term price forecast.

6 Now, what we are trying not to do is to
7 respond with a long run forecast change to what seemed
8 to be short run cyclical fluctuations in price.

9 Q. What effect has your natural gas
10 forecast had on your forecast for electricity demand;
11 that is, as your electricity price forecast has risen
12 at the same time, is there a change in the projection
13 of heating fuel choices in favour of gas and thus a
14 lowering of electricity price, electricity demand
15 forecast?

16 MR. BURKE: A. Maybe I will answer in
17 the aggregate and, then, if you want to look
18 specifically at the space heating market, Dr.
19 Buja-Bijunas could come in.

20 The response that the econometric model
21 suggests of changes in natural gas prices is that
22 effectively they are neutral on the load forecast.
23 There is a positive effect, a positive cross-price
24 effect in the residential sector and a negative
25 cross-price effect from increasing natural gas prices

1 in the industrial sector.

2 One of the pages of Exhibit 100 which
3 summarizes the elasticities has been included in quite
4 a few interrogatories responses, it's page 5, it gives
5 the cross-price effects for natural gas. Within the
6 residential sector, however, the elasticity seems small
7 but one has to bear in mind that the space heating
8 market is about, I believe, 40 per cent or less of that
9 sector.

10 THE CHAIRMAN: I'm sorry, did you say No.
11 5?

12 MR. BURKE: Of Exhibit 100.

13 THE CHAIRMAN: That's liquid fuel, it
14 says.

15 MR. BURKE: Yes. Liquid fuel is the sum
16 of oil and natural gas. Effectively, it's dominated by
17 natural gas, and nobody is going to go very far wrong
18 by taking these cross-price elasticities as being for
19 natural gas or oil.

20 So that the effect of price of gas in the
21 residential sector is captured. That effectively an
22 elasticity, there is certainly going to be a response
23 in the space heating market.

24 Now, in the end-use models, it is treated
25 somewhat differently because it's much more

1 disaggregated and the elasticities maybe don't
2 correspond exactly to what one would impute from the
3 total sector response here.

4 MS. COUBAN: Q. Did you want to add
5 anything, Doctor?

6 DR. BUJA-BIJUNAS: A. If you look at our
7 projections for market share for space heating in new
8 dwellings, I will just look at residential,
9 single-family dwellings, if you look at the period from
10 1990 to 1998 there is a higher relative price of
11 electricity to gas, that leads to an increase in the
12 market share of gas in new. So during the '90s gas's
13 market share goes up for new dwellings. The share of
14 electricity in new dwellings goes down during that
15 period.

16 From 1998 to 2015, we have more, on
17 relative terms, more stable electricity prices and
18 rising gas prices in the residential sector and because
19 of that relatively we have a decrease in the market
20 share of gas in new dwellings relative to an increase
21 of electricity's market share.

22 So that over the whole forecast period,
23 there is actually, for electricity's share in space
24 heating, actually a decrease followed by an increase
25 based on the relatively of gas to electricity prices

1 during that forecast period.

2 Q. Okay. And if we could move on to
3 another area, a few questions on Ontario Hydro's
4 advertising programs. Many of my questions in this
5 area were already asked.

6 Mr. Burke, I believe that your testimony
7 has been that Ontario Hydro's advertising budget has at
8 times being more conservation oriented and at other
9 times more promotion oriented.

10 MR. BURKE: A. That's correct, yes.

11 Q. Do you know when the advertising
12 became more conservation oriented?

13 A. One moment.

14 We looked at the period 1970 to '86 or
15 '87, and the period '76 to '82 was identified as
16 conservation oriented, and the periods before and after
17 were deemed to be largely sales oriented.

18 Q. Now, this may be a question that you
19 can't answer, Mr. Burke, and please say so if you
20 can't. Do you what it means in terms of
21 percentage-wise when you use the term "conservation
22 oriented," does that mean 100 per cent of the
23 advertising budget is conservation directed or just a
24 majority?

25 A. I am pretty sure it's not 100 per

1 cent and I couldn't be more specific.

2 I think the reason we used something as
3 vague as "conservation oriented" was because we didn't
4 think it was 100 per cent.

5 MS. COUBAN: Could I ask, Mr. Campbell,
6 would that be a question that perhaps Panel 4 could
7 deal with?

8 MR. B. CAMPBELL: Well, I think to some
9 degree Hydro does a lot of advertising for tendering,
10 for employment, for general information, there is a
11 whole range of things here and I am not sure that...

12 MS. PATTERSON: It's a consumer behaviour
13 advertising budget.

14 MR. B. CAMPBELL: I have not seen that
15 classification, certainly, when these things are
16 examined in rate matters, but maybe we could take a
17 look at some of the interrogatories that have already
18 been done and see what can comfortably be done, and if
19 I can discuss it with Ms. Couban, we will see if we can
20 come up with something that's useful. I am just a
21 little worried about what gets lumped into various
22 numbers because I think it can be quite misleading.

23 MR. BURKE: If I might comment. The
24 budget that we were talking about in our analysis was
25 in fact what is now called the energy management

1 branch's budget and precursors to that group. So it's
2 expenditures related to marketing efforts or
3 conservation efforts, just at that branch. It wasn't a
4 broader...

5 MR. B. CAMPBELL: It may be that that is
6 a useful proxy. We will take a look at the
7 interrogatory answer and if we feel it covers it, then
8 we will leave it at that; if not, we will have to
9 discuss it further. But if we could leave it on that
10 basis, Mr. Chairman.

11 MS. COUBAN: That is fine. Thank you.

12 Q. Just on a point of clarification,
13 this is with respect to Interrogatory 1.32.1, which is
14 a government interrogatory. Do you have that
15 interrogatory in front of you?

16 MR. BURKE: A. Yes.

17 Q. The question basically asked:
18 "How does the basic load forecast
19 reflect sustainable development
20 directions and respond to the increased
21 economic viability, technological change
22 in energy savings which could occur
23 through softer energy paths."

24 The point of clarification I would like
25 to ask is with respect to the last paragraph of the

1 answer, and specifically the last sentence which says:

2 "They assume" - that is the forecasts
3 I presume - "that existing trends towards
4 more efficiency will continue and that in
5 some cases they will be accelerated by
6 Ontario Hydro programs and in some cases
7 mandated by government standards."

8 My question is, does the reference to
9 Ontario Hydro programs in that last sentence include
10 advertising programs? If not, what programs is it
11 referring to?

12 A. Actually, I am not sure whether it's
13 clear from this response whether when we are talking
14 about forecasts we meant both the basic and the primary
15 forecasts. I would have to reread it carefully to be
16 sure.

17

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...

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1 [11:05 a.m.] But, certainly, my understanding was that
2 the intent here was that these were Ontario Hydro
3 programs which affect the primary load forecast; that
4 is, the electrical efficiency improvement programs.

5 Q. Okay.

6 THE CHAIRMAN: Although the question in
7 itself and the answer refers to -- perhaps not. It
8 seems to be talking about the BLF rather than the PLF.

9 MS. COUBAN: There is reference to the
10 primary load forecast.

11 THE CHAIRMAN: Yes, in the second
12 paragraph.

13 MS. COUBAN: Yes, that's correct.

14 Q. So I take it that you didn't prepare
15 this response, Mr. Burke?

16 MR. BURKE: A. It was a joint effort
17 with Mr. Rothman.

18 Q. Oh, okay.

19 Is that your understanding as well, Mr.
20 Rothman?

21 MR. ROTHMAN: A. Yes. I believe that I
22 was referring primarily to the kinds of programs whose
23 impact would be included in the primary load forecast.

24 Q. Okay. Thank you.

25 Okay. If I could ask a question of you,

1 Doctor. Mr. Greenspoon asked you some questions on
2 Monday, May 6th, which is Volume 8 of the transcript
3 and I will go specifically to the reference in a
4 second.

5 Mr. Greenspoon asked you some questions
6 about the Sunfrost refrigerator and whether you had
7 incorporated the possibility that people would use
8 those fridges instead of larger, more energy-intensive
9 ones.

10 And you responded - and you can check the
11 transcript reference if you like, on page 1536 - that
12 you did not incorporate the Sunfrost because it was not
13 considered to be "a likely economic alternative
14 technology." My question is: What makes something a
15 likely economic alternative technology such that you
16 would take it into account?

17 DR. BUJA-BIJUNAS: A. Okay. When, for
18 example, we look at the efficiency improvement for
19 refrigerators and how, for example, the standard for
20 refrigerators was set in the United States and how they
21 came up with what would be an acceptable efficiency
22 improvement and the economics involved, what they did
23 was - by "they", I mean Lawrence Berkeley Laboratory -
24 what they did was they looked at individual design
25 options on a refrigerator. They have looked at the

1 compressor as a unit to see how much electricity is
2 used by the compressor and what design improvements are
3 economic and what efficiency results from improvements
4 in the compressor.

5 They looked at the side insulation, what
6 could be done to that insulation. They looked at the
7 front door insulation, what could be done there; its
8 individual engineering components, the costs of
9 augmenting those components, and the resulting
10 efficiency improvement.

11 So that is more along the lines of how we
12 look at things; what sort of technical features could
13 be done within a certain dollar value that would be
14 economic in terms of acceptable to the consumer.

15 We relied a lot on Lawrence Berkeley's
16 analysis since they are in the job of doing that, in
17 essence. They look at the impact on the manufacturer
18 and the costs for the manufacturer of putting in
19 additional insulation, say, in the door.

20 They look at what the impact would be on
21 the consumer in terms of the viability of the consumer
22 in purchasing this refrigerator at this higher cost and
23 what his savings would be by using a refrigerator that
24 instead of about a thousand kilowatthours per year was
25 only using 700 kilowatthours per year.

1 So that in the long run, the consumer has
2 the advantage of those electrical savings even though
3 initially it was a higher capital cost because of these
4 design changes. So, we, basically, follow that sort of
5 assumption.

6 Q. Okay. I had a number of questions,
7 Mr. Rothman, on the risks to the economic forecast and
8 specifically environmental regulation.

9 Most of those have already been covered
10 so I am left with one question: That is, I note in the
11 Interrogatory Response 1.6.38, which was an
12 interrogatory from Northwatch, attached to that
13 interrogatory response there is a document entitled,
14 "Short-term Economic Outlook, Winter Review, February
15 1990." And on pages 6 to 7, you talk about important
16 risks to the forecast.

17 I am sorry, do you have that response in
18 front of you? You may not need to have it in front of
19 you, Mr. Rothman.

20 MR. ROTHMAN: A. I will get it. I
21 didn't put it in this binder because I thought it was
22 the '91, I am sorry.

23 Q. Okay, I am sorry.

24 I was going to ask you specifically with
25 respect to page 6 and 7 of the attachment to the

1 response.

2 A. Yes.

3 Q. You talk about risks to the forecast
4 and I notice that you haven't included environmental
5 regulation as a risk to that forecast.

6 Am I correct in assuming that that is
7 because that is a short-term forecast and that
8 environmental regulation is not as significant a risk
9 in a short-term forecast as it is in a long-term
10 forecast?

11 A. Yes, that's correct. This is the
12 February 1991 short-term outlook.

13 Q. Yes.

14 A. I think you said it was the February
15 1990, which is what caused me to --

16 Q. Oh, I am sorry -- yes, it does say
17 February 1991.

18 THE CHAIRMAN: What page are you at, I am
19 sorry?

20 MS. COUBAN: I was looking at page 6 and
21 7.

22 THE CHAIRMAN: 6 and 7?

23 MR. ROTHMAN: Which is what caused me to
24 panic because I have got the 1991 here.

25 MS. COUBAN: I am sorry. I misread it.

1 MR. ROTHMAN: Yes, that's quite correct,
2 this is a short-term forecast and the risks identified
3 here are primarily short-term risks.

4 For example, the discussion here of the
5 risk of Quebec separation is only in terms of possible
6 short-term impacts on the value of the Canadian dollar
7 in non-Canadian interest rates, not on longer-term
8 economic factors, some of which I discussed in my
9 evidence-in-chief.

10 So --

11 MS. COUBAN: Q. But is there no type of
12 environmental regulation that you can foresee having an
13 effect on the short term?

14 MR. ROTHMAN: A. Well --

15 Q. Such that you would include it as a
16 risk?

17 A. This forecast is really focussed more
18 on 1991 and 1992 because it is produced specifically
19 for the purposes of the Ontario Energy Board. Its
20 horizon is actually to 1993 and perhaps 1994.

21 It is certainly possible that there could
22 be environmental regulations that are so drastic and
23 brought in suddenly enough that they could have an
24 impact, but I would not view that as a major risk to
25 this short-term forecast.

1 Environmental regulations, like any
2 legislation, typically take some time to prepare and in
3 fact, would be expected to involve some process of
4 consultation--

5 Q. But you I thought you -- sorry.

6 A. --especially if they were drastic to
7 cause a change in a short-term forecast.

8 So, it is just hard to see, on a horizon
9 like that, drastic enough environmental regulations to
10 cause a significant change in this kind of short-term
11 cyclical forecast.

12 Q. But I didn't think you took into
13 account environmental regulation or the effects of it
14 until you were certain that that was going to become
15 reality; is that not true?

16 So would that not foreshorten the process
17 that you have spoken of, of consultation and the
18 procedure of developing that regulation, such that it
19 would possibly have an effect in the short term?

20 A. Yes, but essentially what I am
21 saying, I guess, is that the environmental regulations
22 that are currently under consideration are not seen to
23 have impacts that are significant enough to cause major
24 differences to this GDP forecast.

25 When we are talking about these, we are

1 talking about - I wouldn't say impacts that we think
2 would be, you know, half, at least, to one per cent on
3 the GDP growth rate in the periods in which we are
4 talking, and really a major risk might be larger than
5 that.

6 So, I think essentially what we are
7 saying is that we didn't see in the pipeline, and
8 likely to be implemented in this time period,
9 environmental regulations that will cause impacts over
10 the short run of that kind.

11 Now, we would take into account such
12 environmental regulations. We think there could easily
13 be environmental regulations of the admissions
14 reduction kind that could have impacts in - I don't
15 know - the .1 to .3 per cent per year range on GDP over
16 a 10 to 15-year period. Those are not insignificant
17 impacts and we would take them into account.

18 But we wouldn't put them in until they
19 were much farther down the road, much farther through
20 the pipeline because we need to be able to see, in
21 order to make that estimate, what the shape of those
22 regulations would be like.

23 Q. Okay. Doctor, I would like to turn
24 to you again. You had a discussion with Mr. Monger of
25 the Consumers' Association of Canada on last Thursday

1 morning, May 9th, 1991, transcript Volume 11,
2 specifically, page 815 to page 818, where you discussed
3 with him the Energy Efficiency Act and the 14
4 categories of appliances to which the Act applies.

5 Now, you told Mr. Monger that the REEPS
6 model only addresses eight key end uses in a detailed
7 nature in doing a full micro-utilization and that all
8 other appliances are labelled "other" and analyzed in
9 aggregate using an econometric approach, but that you
10 also did a comfort check and did a judgmental spread
11 sheet analysis of what the forecast would be for each
12 of those appliances over the period to 2015.

13 Is that substantially what your evidence
14 was?

15 DR. BUJA-BIJUNAS: A. That's correct,
16 yes.

17 Q. Okay. My question is: What sort of
18 gains in electrical efficiency, if any, did you assume
19 for the six categories of appliances which the REEPS
20 model did not address and for which you told us you did
21 judgmental spreadsheets?

22 A. Which particular -- you said six
23 categories?

24 Q. For the six, yes. I believe that the
25 REEPS model can only deal in detail with eight, that

1 there were 14 that the Energy Efficiency Act applies
2 to?

3 A. If you could just hang on a second,
4 please.

5 MR. B. CAMPBELL: While Dr. Buja-Bijunas
6 is looking at it, I think, Mr. Chairman, if we look at
7 page 1817 of the transcript, what the actual evidence
8 is is that the spread sheet divided the other category
9 into 15 appliances covering most of the appliances
10 covered by the Energy Efficiency Act.

11 I think Ms. Couban has read that as being
12 an exact match. I am not sure that the evidence shows
13 that.

14 MS. COUBAN: Okay, that is fair.

15 Q. If you could tell me which of those
16 appliances, other than the eight you did a judgmental
17 spread sheet for; and then, if you could tell me what
18 you assumed in terms of the efficiency for those.

19 DR. BUJA-BIJUNAS: A. I don't have my
20 efficiencies with me.

21 Q. Okay.

22 A. I can undertake to supply those, but
23 I don't have all the spreadsheets with me.

24

25

...

1 [11:18 p.m.] As far as what other appliances, it's
2 lighting, clothes dryers, clothes washers, TVs,
3 secondary space heating, swimming pool filters, furnace
4 fans, whether it is on gas, oil, whatever type of
5 furnace, block heaters, automobile block heaters,
6 saunas and whirlpools, PCs, audio equipment, furnace
7 humidifiers and VCRs.

8 Q. I am satisfied with that undertaking,
9 if you can get those numbers to me.

10 A. Sure.

11 Q. Thank you.

12 Moving to another area, that is, with
13 respect to Exhibit 115. You don't have to pull it up.
14 It is the Challenge Paper from the Ontario Round Table
15 on the Environment and the Economy. I am not going to
16 ask anything specific about it. It is just a general
17 question. I don't think you need to pull it up.

18 The Coalition asked you some questions
19 about that Challenge Paper. And I believe that one of
20 you responded that you had not taken those
21 recommendations into account because those
22 recommendations in your view were still at the
23 discussion paper stage. Is that substantially correct?

24 MR. ROTHMAN: A. Yes, that's
25 substantially correct.

1 MR. BURKE: A. There was another reason
2 and that was the paper came out after our forecast was
3 finalized.

4 Q. That's correct, yes. I remember
5 that.

6 Now I am not disagreeing with your view
7 that those recommendations are at the discussion paper,
8 but if I told you the provincial government is
9 undertaking a process to consider various ways and
10 means of implementing those recommendations, which
11 process is anticipated to be completed sometime next
12 year, my question is: At what point would Ontario
13 Hydro see fit or appropriate to incorporate any aspects
14 of that Challenge Paper into its forecast? Or putting
15 that a little differently, what actions on behalf of
16 the provincial government would it take in order for
17 Ontario Hydro to take the recommendations of the Round
18 Table into account in its forecast?

19 MR. ROTHMAN: A. This process of policy
20 formulation and implementation is an ongoing one. Our
21 best response to it, I think, is to ensure that we have
22 a continuing dialogue with the people who are making
23 and implementing the policy. I don't view it as a step
24 function, at least I try not to.

25 The policy in this area, as in others,

1 evolves over time. We review it once a year and we
2 make our long-term forecast, and I think it is
3 appropriate that we ensure that we have good contact
4 with people in government at that time. We listen to
5 their judgment and to their statements of where they
6 think the policy is and apply our judgment to the
7 impacts of that policy and to whether or not it is
8 there.

9 As I have said, even if we were to have a
10 defined policy responding to some parts of this
11 Challenge Paper ready for immediate implementation and
12 were therefore to include it in the forecast, that
13 doesn't mean that there isn't still some longer term
14 consideration that we have to give to the future of
15 policy in that area and some accounting, some
16 representation of that policy in the long-term
17 forecast. That probably can't be specific, but it
18 could be expected to be along a general set of lines.

19 As I have said, we are in the process now
20 of altering our economic forecast model to take better
21 account of specific kinds of environmental policies; in
22 particular, those that require capital investment, that
23 do not produce measured GDP at the rate that other
24 capital investments would. We will have that in place.
25 We will be able to use that to analyze the impacts of

1 the policies as they get better defined.

2 There is also a difficult question of
3 what is happening within industry anyway. Certainly
4 many industries, as they plan future capital
5 investment, are not planning only just to meet current
6 regulations. Many industries are aware or believe that
7 future environmental regulations, future emission
8 controls will be stricter than those that now exist,
9 and that it will be more costly in the long run if they
10 have to retrofit when new regulations are put in place.

11 So, there is already in place progress in
12 the direction of lower emissions without the
13 regulations. So that if the regulation were to be
14 implemented, again, it wouldn't necessarily have a step
15 function kind of impact.

16 As I say, I see this all as an evolving
17 process and our forecast is an evolving forecast. We
18 have to be aware of where the legislation is going and
19 what its shape is. We can't do all of that ourselves.

20 As I have said, our forecast suppliers
21 are, also, of course, concerned with these issues and
22 do the same process as we do. Fortunately, one of them
23 is located in Ottawa so they can talk to the government
24 officials in Ottawa more easily than we can, and we get
25 information from them as well.

1 So, your question is what would the
2 government have to do for us to put it into the
3 forecast. I don't look at it as like the day that the
4 bill goes on the order paper is when we put it into the
5 forecast or the day that the bill is passed we put it
6 into the forecast. It is in what direction these
7 policies are evolving and how are they being shaped in
8 general. That's what has to shape our forecast in
9 general.

10 Q. I am almost finished, Mr. Chairman,
11 just a few more questions.

12 Following along on that kind of a theme,
13 Mr. Rothman, last Thursday, that is May 9, 1991, you
14 had a discussion with Mr. Shepherd about judgment in
15 your forecast. The transcript of that day is Volume
16 11.

17 One of the aspects he discussed with you
18 was your assumption on judgment not to include the
19 concept of sustainable development in your forecast.
20 Your response on page 1962, lines 8 to 11, if you would
21 like to check it, was that although governments have
22 talked about defining such policies, they haven't yet
23 defined them clearly enough to produce a set of
24 implementable policies.

25 And then you went on to tell, on that

1 same page, to tell Mr. Shepherd that you make your
2 judgment after having talked to the government and to
3 officials who are responsible for policy development
4 and implementation. Would you agree that that was
5 substantially your evidence that day?

6 A. Yes.

7 Q. My question is: Have you spoken to
8 policy officials within the new provincial government
9 to find out the new government's intentions with
10 respect to sustainable development; and, if not, do you
11 intend to do that; and if so, when?

12 A. I haven't, myself. I can't be sure
13 that my staff has or not, but I suspect they have. And
14 if the answer to both of those questions is no, that we
15 haven't, I intend to as soon as we get clear of these
16 hearings. I agree. I think that is an important piece
17 of content, as I have said.

18 MS. COUBAN: Those are my questions, Mr.
19 Chairman.

20 THE CHAIRMAN: Thank you. I take it that
21 ends the questioning by the parties. We will adjourn
22 now for fifteen minutes.

23 THE REGISTRAR: This hearing will recess
24 for 15 minutes.

25 ---Recess at 11:30 a.m.

...

1 ---On resuming at 11:50 a.m.

2 THE REGISTRAR: This hearing is again in
3 session. Please be seated.

4 THE CHAIRMAN: Dr. Connell, do you have
5 any questions you want to ask the panel?

6 DR. CONNELL: Yes. Thank you, Mr.
7 Chairman.

8 EXAMINATION BY DR. CONNELL:

9 Q. Perhaps I could begin by asking any
10 of the members of the panel if they ever had any reason
11 to consult their horoscopes, or tarot cards, or any
12 other arcane devices?

13 MR. ROTHMAN: A. I think somebody gave
14 me a Ouija-board as a Christmas present once, but I
15 haven't consulted it for the forecast.

16 Q. Thank you. That's reassuring.

17 We have heard a great deal about price
18 and it really has become apparent to me that I lack a
19 broad understanding of patterns of price of electrical
20 energy, and I simply would like to put it to you as a
21 request. I am not sure exactly what to ask for, but I
22 can just perhaps specify it this way, that I would like
23 a kind of display of price information that could be
24 got onto one page. If it's very complex, I would like
25 perhaps to be just selective but representative of the

1 different sectors. Perhaps if I could have some
2 notation which would explain the relationship between
3 Ontario Hydro and the municipal utilities with respect
4 to price setting.

5 Is that a reasonable request?

6 MR. B. CAMPBELL: I think it is clearly
7 reasonable.

8 I think if we could approach it this way,
9 the question being somewhat general, there are a huge
10 number of published rate schedules that are very
11 detailed and technical. I would expect that we could
12 provide a summary of that, and I think that if its
13 agreeable to the panel, if we could prepare that and
14 provide it to Ms. Morrison and she could give us any
15 direction as to whether that is what is contemplated or
16 say no, I want a little more detail here or could you
17 explain that, then we would perhaps use that mechanism
18 to be sure that we are being responsive to the kind of
19 information that you are seeking.

20 DR. CONNELL: That will be fine.

21 MR. ROTHMAN: There are tables in the
22 energy price trends report that simply lay out prices.
23 Perhaps a table like that which has wholesale and
24 retail prices by residential, industrial and commercial
25 sectors. Let me just check this. What you are asking

1 for is effectively how those prices are derived, how
2 these relationships come about?

3 DR. CONNELL: Q. Well, I think mainly
4 what I would like to have is a handy reference document
5 or sheet that I could refer to when I am looking back
6 through our records of the last four weeks so I could
7 compare specific observations that have been made with
8 general price patterns.

9 I think you are right, there probably is
10 most of the information I need in the documentation but
11 simply to have it in an easily-accessible form is what
12 I am looking for.

13 MR. ROTHMAN: A. You mean historical
14 price patterns? Historical forecasts?

15 Q. No, current, current prices.

16 MR. B. CAMPBELL: I think I understand
17 what is being asked and we will prepare something and
18 you want a little more detail or slight change in focus
19 then dealing through Ms. Morrison, we will make sure
20 that you get what you need.

21 DR. CONNELL: Thank you very much.

22 Q. Continuing just on the issue of
23 prices, I wonder if it would be feasible to look at an
24 alternative load forecast, basic load forecast for say
25 2015 with price as the only variable. Maybe this is

1 already available in an interrogatory. But could one,
2 for example, just assume that your cost analysis gave a
3 10 per cent higher price projection than the one that
4 is actually embodied in the median forecast and examine
5 the impact of that price change on the basic load
6 forecast. That can be done?

7 MR. BURKE: A. Yes. I think there is an
8 interrogatory that has that but I could customize it
9 more to your particular question.

10 Someone did ask what the time path of the
11 response to a 10 per cent increase in price would be.

12 I presume what you mean is that price
13 change, say next year it goes up by by 10 per cent and
14 stays up by 10 per cent for the whole period, or do you
15 mean it rises to a total of a 10 per cent higher real
16 rate than it is at the end of the period?

17 Q. I was thinking of the latter, but I
18 am not particular about the time path as long as it's
19 consistent.

20 I would like to see if this is feasible,
21 say something like a plus 10 per cent/minus 10 per
22 cent, just check the symmetry, and then perhaps a plus
23 20/minus 20 to check for linearity, but those are take
24 those as illustrative, not specific.

25 A. Sure.

1 THE CHAIRMAN: That would be with price
2 as the only variable?

3 DR. CONNELL: Yes, holding everything
4 else constant insofar as possible.

5 THE CHAIRMAN: Although that wouldn't be
6 what happens. Wouldn't price changes have effects on
7 other variables?

8 MR. BURKE: Well, we can certainly do the
9 exercise as requested.

10 THE CHAIRMAN: All right.

11 MR. BURKE: I think the issue that is
12 complicated for us is that in practice it's a -- the
13 forecast is the combination of two, the end use and the
14 econometric, and what I would have to do, in providing
15 the results, either explain that we have done it purely
16 through the econometric approach or we might try to do
17 it simulating the whole process. That is what the
18 econometric would say, what the end use would say and
19 how we would roll it together.

20 But typically, when we are asked
21 questions about price sensitivity pure and simple, the
22 results we give are derived through the econometric
23 model and I would essentially apply the per cent
24 changes to the recommended forecast.

25 DR. CONNELL: Q. I am happy to have

1 simplifying assumptions as long as I know what they
2 are.

3 MR. BURKE: A. Yes.

7 May I ask you, is the uncertainty
8 function a normal distribution?

9 A. Well, in the procedure we use, the
10 only place where normality is assumed is the
11 distribution applied to the population growth rates.
12 Through the translation process from population into
13 GDP, the simulations don't necessarily result in a
14 normal distribution for GDP. And we take the simulated
15 distribution for GDP and use that, provided it
16 satisfies all those checks we were talking, in the load
17 distribution, in the calculation of the load
18 distribution.

19 By the time we get the load distribution,
20 it certainly is not symmetric anymore. There is a
21 slight skew, that is the distribution is slightly
22 weighted to the high side. It means that, for
23 instance, at the end of the period it's plus 22 per
24 cent, minus 18 per cent about the median. In terms of
25 the weighting, that the upper band is relative to the

1 lower band. So that the equations themselves and their
2 relationships alter that initial normal distribution.
3 We prefer to do it that way rather than imposing
4 normality each step of the way because we would
5 invariably end up with symmetry.

6 Now, one of the approaches we tried as an
7 alternative, which is discussed in Exhibit 10, was the
8 Monte Carlo simulation. I think the major difference
9 between Monte Carlo simulation pure and simple and what
10 we have done is at each step of the way the
11 distributions are assumed to be normal distributions.

12 In that case, given that we felt that the
13 distributions were not symmetric, we did have different
14 standard deviations whether the result was above the
15 median or below the median. So, it is possible to
16 maintain assumptions of normality in terms of the shape
17 of the distribution but do it in such a way that
18 distribution reflects skews that seem to be revealed by
19 the data. But, as it turns out, our approach is
20 distribution-free after that initial assumption about
21 population growth rates.

22 Q. I wonder then if I could ask you,
23 perhaps you can do this on the back of an envelope, but
24 I would be interested to know the relative probability
25 of say a very small delta energy at the peak compared

1 to at the 10 per cent and at the 90 per cent margins?

2 A. I am not sure I understood what you
3 meant by at the peak versus at the --

4 Q. At the median.

5 A. At the median, I see. Okay.

6 Q. And to know whether the ratio of peak
7 to marginal probability is consistent throughout the
8 time course.

9 A. Well, I think that may be one of
10 those things where we should check back to make sure we
11 have done what you have requested, because I have to
12 admit at this point, I am not precisely sure. I think
13 I have a sense of what you want; if it's not we could
14 go a through iterations on that to make sure you do get
15 what you are looking for

16 Q. Yes. It is certainly not
17 comprehensive. It is just a bit of sampling here and
18 there to get some sense of the ratios, peak probability
19 to --

20 A. To tail.

21 Q. Yes.

22 A. Okay.

23 Q. Finally, a question to Mr. Rothman.
24 I don't think I have a good grasp of the impact of
25 various inflation scenarios on your economic forecast.

1 I wonder if you could just comment on that in
2 qualitative terms generally, if we had a very favour
3 experience of inflation over the next 25 years, if it
4 came down to the 0 to 2 per cent range and stayed
5 there, generally what would you think would be the
6 impact on your economic forecast?

7 MR. ROTHMAN: A. I would think that a
8 low and stable inflation rate would be over the long
9 run beneficial for the economy. We have seen that high
10 and unstable inflation rates have been negative for the
11 economy.

12 There is some difficulty and some pain in
13 getting to that low an inflation rate, as the Bank of
14 Canada is discovering. But really, the notion that we
15 could get to a low and stable inflation rate, and that
16 that would be beneficial for the economy, is one the
17 aspects of the positive risk that I mentioned to the
18 forecast, I think, in the beginning.

19 On the other side of the coin, as I have
20 said, if we were to have a vacillating monetary policy
21 and therefore high and unstable inflation rates, I
22 think that would be negative for the economy because it
23 forces economic decision-makers to focus on the nominal
24 consequences of their decisions rather than on what is
25 really going to happen in terms of the real output.

1 It forces decision-makers to worry about
2 hedging against the higher inflation or lower inflation
3 in the future rather than focusing on hedging against
4 real events as opposed to nominal ones.

5 Our forecast is somewhere in the middle.
6 We don't forecast very low inflation rates but, we do
7 forecast relatively stable inflation and monetary
8 environment. And we forecast primarily in real terms.
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...

1 [12:05 p.m.] That is, most of the forecast doesn't
2 look at inflation as a separate variable. And the
3 impact that it does have, of course, is on real
4 interest rates. And that feeds through to the
5 forecast.

6 Q. Would it generally tend to damp out
7 the cycles?

8 A. You get a low inflation rate, a low
9 unstable inflation rate over the long run, if you have
10 a very stable monetary policy of keeping monetary
11 growth, money supply growth, at about the rate of
12 growth of the economy.

13 Q. Are you speaking of M1 or currency?

14 A. Speaking of M1 and currency,
15 whichever 'M' turns out to be the right one. That is
16 part of the problem of implementing such a policy.

17 If you had such a stable monetary policy
18 environment, that would tend to lead to stable economic
19 growth rates or tend to promote stable economic growth
20 rates. You would also tend to get a stable inflation
21 environment if you don't have a lot of external shocks
22 like energy price crises, oil price shocks. And that,
23 too, absence of such shocks, would also tend to lead to
24 stable economic growth.

25 So, I don't think it is the inflation

1 itself that would produce stable economic growth, but
2 the conditions that would produce low unstable
3 inflation would tend to produce also stable economic
4 growth, more stable than if we had higher or less
5 stable inflation rates.

6 Q. And the net impact over 25 years
7 would be probably greater growth in GDP than in your
8 actual forecast?

9 A. Yes.

10 DR. CONNELL: Thank you. That is all.

11 EXAMINATION BY MS. PATTERSON:

12 Q. I guess, Mr. Burke, I was wondering
13 whether you have done any systematic review of our
14 jurisdictions and how they do their load forecasting
15 when you arrive at your methodology. I know that you
16 take into account the Ontario Energy Board
17 recommendations and other recommendations in this
18 jurisdiction, but do you go any further than that?

19 MR. BURKE: A. Well, maybe I can --
20 focusing on the long term, certainly in the case of our
21 end-use modelling efforts, we have been very sensitive
22 to the need to improve our end-use modelling
23 capabilities over the years.

24 And we acquired the EPRI products -
25 REEPS, COMMEND and INDEPTH - about three of four years

1 ago. And by about two years ago, we had gotten to the
2 point with them that we understood how the models
3 worked. We had the data assembled to be able to run
4 them for Ontario and we began to understand some of the
5 limitations of those models.

6 And as a result of that, Dr. Buja-Bijunas
7 conducted a survey of other utilities' end-use
8 modelling systems in order to get a sense of whether
9 there existed out there end-use modelling systems that
10 were in some sense better than ours, better both from
11 the perspective perhaps of forecasting but primarily
12 better, I would say, from the perspective of being able
13 to analyze the impact of demand management programs;
14 that is, more detailed still than the end-use models we
15 have. And I think she could describe what she found
16 there if you want to pursue that.

17 I think on the econometric side, as I
18 have said, the number of utilities that do econometric
19 models is certainly dwindling, at least, of the sort
20 that we are doing it. Many utilities have
21 single-equation models and so on. We have contacts
22 with the other Canadian utilities and I think we keep
23 up to date with the sorts of things they are doing.

24 But I would say we have not done as much
25 searching across North America - that is in the U.S. -

1 for the precise details of how other utilities do
2 econometric forecasting these days. We have a pretty
3 good sense of who is actively participating in
4 econometric forecasting in the U.S., but essentially,
5 we are much more familiar with what Canadian utilities
6 are doing.

7 Q. Would you go any further than the
8 States in your search for other modelling techniques?

9 A. I think probably it is fair to say
10 not really, no. I mean, we read papers about energy
11 demand and electricity demand and so on that may come
12 from Europe and Japan and so on, but when it gets into
13 the specifics of how utilities model, I'd say we don't.

14 We attend various North American
15 conferences that review demand forecasting methods,
16 particularly those offered by the Electric Power
17 Research Institute, but if you would like more
18 information about the end use ...

19 Q. Well, my question was really more
20 general, I think, in terms of where you go for, you
21 know, in terms of innovation of your techniques.

22 I guess the other question that relates
23 to that is what other utilities do in terms of the
24 length of their forecasts.

25 A. Well, in preparing for the hearing,

1 we tried to collect as many forecasts from other
2 jurisdictions as we could. And typically, I would have
3 to say the forecasts terminate in the period 2005 to
4 2010, the long-term ones. I am not sure we came across
5 too many that went to 2015.

6 The American utilities, I think, perhaps
7 have a shorter - relatively speaking, a shorter
8 planning horizon in that sense. And quite often
9 forecasts to the year 2000 or 2002 maybe are all that
10 is available, although some utilities go out to 2015.

11 The California utilities, as I recall, go
12 to about 2008 at this point. That would have been a
13 20-year forecast, from '88 to 2008.

14 Q. Now, I understand that France, for
15 example, has a large nuclear component to supply energy
16 and so I was wondering what kind of time horizon they
17 would use for a forecast period?

18 A. Well, I have to admit that I don't
19 know. I could check.

20 Q. Well --

21 A. Done.

22 Q. I guess the other, quite general,
23 question I have is whether you have done any surveys or
24 have any examples of successful targeting in other
25 jurisdictions.

1 A. I have to say that, while I have
2 asked people to try to find some, we have yet to come
3 up with any. And I think that my sense of where
4 targeting conceptually is furthest advanced is in
5 things like meeting certain environmental goals, such
6 as setting -- well, we haven't really come to setting
7 CO2 emission targets finally yet, but I believe there
8 is a Montreal protocol on nitrous oxide, I am not sure.
9 Anyway, that is an area where targeting is further
10 advanced.

11 I think I am pretty confident that in
12 North America, no utility has particularly planned on
13 the basis of achieving a certain target sort of by
14 now -- sort of set a target for itself in the '70s and
15 that was the basis of its plans for today.

16 The California Energy Commission is, I
17 think, the most advanced sort of regulator of electric
18 utilities in the sense of interfacing with the
19 utilities on their demand forecasts and recommending
20 programs and standards and so on. But I am not sure
21 that one could even say that in California, targets
22 were set in terms of the load to be achieved by a
23 certain year.

24 I think that there, utilities -- well,
25 the state effectively established wide-ranging

1 standards in the late '70s and added to them in the
2 '80s, which have the effect of making a significant
3 impact on load currently and into the future, but I
4 don't think it is to the point where they have set a
5 target in some sense for load.

6 Q. Thank you. I hesitate to ask this
7 next question because, I must say, I didn't follow the
8 evidence very well the other day, when you were being
9 cross-examined by Mr. Shepherd on Dr. Chapman's
10 analysis in Exhibit 97.

11 And I have read the transcript and I
12 hope I understand the second part of what the abstract
13 discusses. But the first criticism was that Ontario
14 Hydro has assumed that the standard deviation for
15 population is a function of the predicted mean, an
16 assumption that is contrary to accepted theory and
17 produces mathematically unacceptable results on
18 reasonable hypotheses.

19 Could you restate or give me a
20 simply-stated answer to that critique?

21 A. To the criticism? Well, essentially,
22 we have scaled the standard deviation and we have
23 scaled it to achieve a result, which is a reasonable
24 GDP band. And if we were doing a purely statistical
25 analysis of the relationship between population and GDP

1 and we were not applying any sort of sanity checks,
2 credibility checks whatsoever to the result, we would
3 probably have not scaled the standard deviation. We
4 would have left it as it was.

5 The result would have been a GDP band
6 which was out of keeping with a broad range of accepted
7 opinion about where GDP will fall in the long term;
8 that is, there is quite a consensus amongst
9 economists - not just our 15 that we happen to have
10 precise numbers for - on this view that long-term
11 potential growth is a reasonable concept that the
12 economy does come back to its long-run potential growth
13 path if it deviates from it, in the short term.

14 So that there is not a perception that
15 the economy over a 25-year period can wander
16 significantly from that path, certainly not with
17 reasonable probabilities - that is at the 80 per cent
18 probability level - at the extreme possibilities that
19 you could have a 25-year boom and we could have five
20 per cent growth in the economy when we are suggesting
21 the potential is less than three.

22 And there is an extreme chance that you
23 could have, effectively, a depression in Ontario that
24 is zero growth for 25 years but, again, very low
25 probabilities for that. ...

1 [12:18 p.m.] And within the range that people think,
2 that is, around the 2-1/2, 3 per cent area, which is
3 where potential for GDP has been estimated in Ontario,
4 GDP growth, the departures from that that could be
5 sustained over a 25-year period are not considered to
6 be that wide, perhaps plus or minus a per cent or so,
7 when forecasters are asked to express their opinions on
8 that.

9 We had a model that was nice, but it
10 didn't happen to produce results that, without some
11 adjustment, were reasonable, and it's quite common in
12 forecasting to make judgmental adjustments when you do
13 get unreasonable results.

14 This is a different case. Here we are
15 making not an adjustment to the forecast but to the
16 standard deviation of the forecast. Our objective, as
17 I guess I have said quite often, was to have a
18 reasonable GDP band, and that was a separate analysis,
19 something that we had to do in order to estimate load.
20 It wasn't as if we were trying to produce a load
21 forecast from population. That wasn't our objective.

22 Our objective was to be able to estimate
23 GDP uncertainty in a sort of fairly mechanical way.
24 And I think the way we have has to be refined a little
25 bit because it leads us into some problems as has come

1 up in this period, in this hearing, about some of the
2 later years.

3 But, effectively, what happened with Dr.
4 Chapman is he went the other way. He said, 'Well, the
5 historical average of 0.42 for this long-term standard
6 deviation - I think a 25-year value or whatever, or I
7 guess he was using a 10-year value at that point - to
8 2000 is perhaps low, we will try 0.5.' And it was at
9 that point I pointed out that the bandwidth that he got
10 for load on page 4 of his exhibit had implicit in it a
11 very wide distribution for GDP.

12 And, in fact, this is something that I
13 probably should correct on the record. I have actually
14 understated the width of it. I said it was 1 per cent
15 to 6 per cent; it is actually minus 1 per cent to 6 per
16 cent. It is even wider than I had suggested at the
17 time and therefore less reasonable even than I
18 indicated in that testimony. I had forgotten about the
19 minus sign.

20 But it is an extremely wide GDP band and
21 therefore not a credible GDP band; and it is precisely
22 because that's the sort of result one gets if one
23 doesn't scale population that we applied this scaling
24 factor.

25 In other applications of economic

1 modelling, the use of add-factors in models is quite
2 common. It's preferable not to have to do that. But
3 it is in fact a way for a judgmental override to be
4 placed on a model so that it produces hopefully
5 consistent but still reasonable results. So...

6 I will just leave it there.

7 Q. I guess the next question is, perhaps
8 to Dr. Buja-Bijunas, and this relates to the questions
9 on solar energy and the fact that solar energy was
10 basically discarded as a technology on 1983 data. I am
11 wondering how you track technologies and what impacts
12 they might make. In other words, are there other
13 technologies that might have been discarded on the
14 basis of data that old?

15 DR. BUJA-BIJUNAS: A. In the case of
16 discarding solar, it really was because it accounted
17 for a very small impact. Talking with EPRI located in
18 California, they weren't pursuing it very much; and so
19 of all the many things there were to pursue, it wasn't
20 given a very high priority.

21 As far as technologies in other end
22 uses -- a good example is the industrial sector. We do
23 keep track. In the iron and steel industry, for
24 example, there are a number of new technologies that
25 are either in the developmental stage or else are just

1 concepts. We attend conferences, we do literature
2 searches, we talk to the research division here at
3 Hydro, which has a group looking at primary metal
4 technologies. We try to keep as current as possible in
5 various new technologies that impact all three of our
6 sectors.

7 So keeping current on technology is one
8 of the most important things you can do for end use.
9 It is the only way you can really get a feel for where
10 the efficiencies are going to be going and if there
11 will be fuel switching and what will be causing it. It
12 is just this particular instance that we had to use our
13 resources to look at other areas.

14 Q. Thank you.

15 Mr. Burke, in Ms. Mackesy's cross-
16 examination, you talked about demand charges. And that
17 I take it referred to customers having to pay more or
18 having had to pay more if they used more electricity or
19 over a certain amount. And I am wondering how were
20 those charges calculated?

21 MR. BURKE: A. Well, I can't remember
22 the context with Ms. Mackesy. But Ontario Hydro in
23 billing its municipal utilities or its direct
24 industrial customers talks about having two types of
25 charges for power: demand charge and an energy charge.

1 The demand charge is a charge per
2 kilowatt of maximum peak demand per month, and energy
3 charge is a charge per kilowatt hour. The energy
4 charge is what may have a declining block rate; that
5 is, the charge per kilowatt hour may depend on the
6 number of kilowatt hours consumed by that customer per
7 month. But for each class of customers, there is also
8 a demand charge which is some number of dollars per
9 kilowatt for the maximum demand they put on the system
10 in a month.

11 I don't know the context in which this
12 came up, but certainly if it was in the context that I
13 recall, which was talking about load factors, maybe it
14 wasn't, I had talked about the fact that we had had
15 changes in our demand charges and demand energy split
16 over time and that that may have contributed to the
17 change in the load factor that was observed between the
18 50s and the 70s and that I hadn't yet modelled that to
19 be sure that that's what accounted for that ramp-up in
20 the load factor.

21 Q. I guess I am really just asking
22 whether you just take a figure out of the air to arrive
23 at a demand charge or whether it's calculated?
24

25 A. The intent of the demand and energy
charges - and here I'm not an expert but nonetheless I

1 think I won't go too far wrong - is to, in fact, track
2 accounting costs for each customer class. The
3 proportion of revenue collected through the demand
4 charge versus through the energy charge is supposed to
5 have some sort of basis in cost; that is, whether the
6 costs for that sector reflect costs of capacity or
7 costs of energy service.

8 These are sort of aspects of rate making
9 that I guess the Ontario Energy Board satisfies itself
10 with that Ontario Hydro is appropriately assigning
11 these costs to the correct component of either capacity
12 or energy and to the correct customer class.

13 Q. My last question. If all other
14 factors stayed the same, how big a price increase would
15 create a forecast which was still just within the 80
16 per cent uncertainty band? I am just trying to get at
17 the impact of significant shifts in price. You have
18 done elasticities that relate to price that don't show
19 large price increases.

20 A. What do you mean by staying within
21 the 80 per cent band?

22 Q. Well, at what price would you get to
23 one of the --

24 A. To one of the bandwidths?

25 Q. To what Mr. Thompson called a UFO, to

1 something that was highly improbable?

2 A. Well, by 2015, the bandwidth is
3 roughly plus or minus 20 per cent. It's slightly
4 asymmetric, plus 22 minus 18. And roughly speaking the
5 price elasticity is minus 0.4, so that, roughly
6 speaking, a 50 per cent real price increase in
7 addition -- price change from what we have in the
8 forecast would put you at the boundary by 2015. Those
9 are rough, but it's close enough, I think.

10 MS. PATTERSON: Thank you.

11 THE CHAIRMAN: I just have one question.

12 EXAMINATION BY THE CHAIRMAN:

13 Q. We have before us here the
14 Demand/Supply Plan. Hydro has a Demand/Supply Plan for
15 25 years. That was based, as I understand it, on the
16 1988 forecast. There have been two forecasts since
17 that time.

18 Before we were finished here, the 1991
19 forecast will come out. How do you propose to
20 integrate the 1991 forecast into the context of the
21 Demand/Supply Plan? I am not talking about
22 procedurally, I am not talking about this hearing. But
23 how do you propose to present the 1991 forecast,
24 bearing in mind that there is this current 25-year plan
25 and these procedures are going on?

1 MR. B. CAMPBELL: Do you mean present to
2 this Board?

3 THE CHAIRMAN: Well, eventually, we are
4 going to have to see it, but I suppose I mean
5 internally and externally.

6 MR. BURKE: It is my understanding that
7 we will continue our annual cycle of producing load
8 forecasts, so there will be a 1991 load forecast.

9 And given the fact that the world changes
10 and we find out about new policies and so on, different
11 price projections, et cetera, it will probably be
12 slightly different from the 1990 load forecast.

13 THE CHAIRMAN: Q. Well, I assume there
14 is a very low probability it will be the same.

15 MR. BURKE: A. You can always hope these
16 things are offsetting, but you never can tell.

17 (Laughter)

18 So, given that that is the case, the
19 corporation I believe would continue to revise its
20 plans as it has I believe since 1988. But, I really
21 can't speak to how the forecast would be used.

22 Q. In other words, you will go ahead and
23 do as you have always done, notwithstanding that there
24 is this current comprehensive plan that is under
25 consideration?

1 A. I think part of the hope is that the
2 plan is sufficiently robust to the forecast that the
3 changes, the sort of changes of the order we have been
4 making, certainly up to now, should not alter
5 fundamentally the plan. There is a certain flexibility
6 that is supposed to be inherent in this plan. The
7 changes that we have made in two years - I think we
8 were 3 or 4 per cent different in the year 2015 than we
9 were in '88 - that sort of change, as I understand it,
10 does not fundamentally alter the plan.

11 And presuming we didn't produce a load
12 forecast that deviated more than -- I don't know what
13 percent it would take to cause the planners to really
14 think that they have to change the plan. But given
15 that we are planning for a range result, I would
16 suggest we probably have to change the forecast quite
17 substantially to alter the plan significantly. But
18 there we are getting into the area which I don't feel
19 qualified to comment upon.

20 Q. But the forecast itself will then in
21 effect amend the plan to a certain extent. For
22 example, you take the market share of various sectors;
23 that changes every year. And I guess what we would
24 like to see is some kind of summary of what those
25 changes are and why they have occurred.

1 A. In the last two or three years?

2 Q. Yes.

3 A. In a sense, the plan responds to the
4 total.

5 Q. I understand that.

6 A. But we can certainly provide
7 information on how the forecast has changed on a
8 sectoral basis and perhaps more detailed by end use and
9 so on, if that would be of help.

10 But were the forecast to change for '91
11 and be slightly different from the one for 1990, it's
12 really the change in the total for basic load and
13 ultimately for primary load that would cause an impact
14 on the planners.

15 Q. For example, if in 1991 you were
16 taking into account environmental regulations to a
17 greater extent than you did in 1990, somehow or other,
18 I would like to see all that collected together in one
19 place rather than have to pore through the documents to
20 find it. I guess that's what I'm saying.

21 A. Really, what you would like to see is
22 what has changed exactly between the 1990 and 1991
23 forecast when that comes out?

24 Q. I think that would be helpful.

25 A. Certainly.

1 MR. B. CAMPBELL: When the 1991 forecast
2 process is complete, we certainly anticipate that there
3 would be some interest and we will come back to you
4 with the proposed mechanism for bringing that back.

5 On the planning side, it is quite clear
6 that on the later panels, having discussed the various
7 options, when we bring them together and demonstrate
8 how the plan is put together and on what basis, part of
9 that discussion will focus on precisely this issue of
10 how it responds to change.

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1 [12:40 p.m.] You have seen change from '88 to '90.

2 The plan is designed, it will be our submission, it is
3 designed to accommodate and was designed with that kind
4 of flexibility in mind, and that certainly will be one
5 of the things that we will be speaking to in later
6 panels.

7 There would be no point in having a
8 long-term response to a forecast, a long-term planning
9 exercise, that was so brittle that it could not
10 accommodate any change, and it could be certainly
11 argued that this plan is sufficiently flexible to
12 accommodate reasonable change.

13 I suppose there must be some level at
14 which it can't, but certainly it is the position of the
15 Corporation at the moment that that is not anywhere
16 near where we are. We understand that will be an issue
17 that we will have to deal with in later panels when all
18 of this is put together.

19 THE CHAIRMAN: Do you have any reply
20 questions you want to ask?

21 MR. B. CAMPBELL: I do. Thank you, Mr.
22 Chairman.

23 RE-DIRECT EXAMINATION BY MR. B. CAMPBELL:

24 Q. In my usual position in reply,
25 following the panel's questions as one does, my small,

1 little matters seem insignificant by comparison but I
2 think I will ask them anyway.

3 I want to start with you, Mr. Burke, and
4 ask if you could turn up Exhibit 107, pages 19 and 20.
5 That is the Coalition's group of overheads.

6 I am going to be drawing your attention
7 particularly to page 20. But at Volume 7, pages 1340
8 and 41 of the transcript, you discuss this list of
9 recommendations generally with Mr. Poch, and I would
10 like to draw your attention particularly to the
11 recommendation of the Energy Planning Technical
12 Advisory Panel to the Minister of Energy, which
13 recommendation was dated July '88. Page 20 of Mr.
14 Poch's exhibit, that recommendation was reproduced with
15 the introductory words of the EPTAP group:

16 "In view of the importance of gaining
17 a clearer and more detailed view of
18 probable future consumption patterns, the
19 Panel recommends that:

20 5. Ontario Hydro urgently commit the
21 financial and human resources necessary
22 to enhance its forecasting capability, in
23 particular to develop a comprehensive
24 end-use forecasting system that
25 incorporates appropriate econometric

1 techniques."

2 And my question is, how do the end-use
3 modelling efforts that you have spoken of throughout
4 this hearing, yourself and Dr. Buja-Bijunas, how do
5 they compare to what is suggested in Recommendation 5
6 of the Electricity Planning Technical Advisory Panel in
7 terms of them being a comprehensive end-use forecasting
8 system that incorporates appropriate econometric
9 techniques?

10 MR. BURKE: A. Well, they are certainly
11 comprehensive in the sense that we cover all of the
12 electricity end uses for the province with the
13 combination of either the EPRI models or in the
14 industrial sector we have additional end-use modelling
15 from a previous industrial model that we used to
16 supplement the INDEPTH models, and, I believe, some
17 smaller end uses that are treated on an individual
18 basis that are not covered by REEPS, COMMEND or
19 INDEPTH.

20 Q. Does the end-use forecasting system
21 you use fit within this recommendation for a
22 comprehensive end-use forecasting system that
23 incorporates appropriate econometric techniques?

24 A. Maybe I should say, in the area of
25 appropriate, in the industrial sector there is no use

1 of econometrics, I believe. And the technique that is
2 used there we believe to be appropriate. It's a sort
3 of a valuation on a cost benefit basis of the
4 individual technologies.

5 In the residential model there are
6 econometric equations which are used to determine
7 market shares of some of the major technologies, major
8 end-uses such as space heating. And so the techniques
9 are there. I think you have to say, though, that we
10 have not re-estimated those equations for the Ontario
11 situation.

12 Q. My question is simpler than that, Mr.
13 Burke. It is simply: Does, in your judgment, the
14 forecasting system that you employ fit within the EPTAP
15 recommendation for providing a comprehensive end-use
16 forecasting system that incorporates appropriate
17 econometric techniques?

18 A. Well, I think the techniques are
19 appropriate, but I think to be fair, we have work still
20 to do to fully implement them for Ontario.

21 Q. All right. Mr. Rothman, turning to
22 you. You had a discussion with counsel for Energy
23 Probe about marginal cost pricing. I think it occurred
24 in several places. I don't think you need to turn up
25 the transcript. One example I will give just for

1 purposes of the record, it is in and around Volume 11,
2 page 1913. My question to you is this: Are you aware
3 of any utility in North America which calculates
4 marginal costs and then charges rates equal to those
5 marginal costs?

6 MR. ROTHMAN: A. No.

7 Q. If an electricity price is set to
8 produce a different revenue requirement from that which
9 would result from prices set at marginal cost, is that
10 price in fact a marginal price within the definition of
11 economic efficiency discussed with counsel for Energy
12 Probe?

13 Do you want me to repeat that?

14 A. Are you saying that if you charge a
15 price that isn't set at marginal cost, is that a
16 marginal cost price? That's the closest...

17 Q. No. I want to give it back to you
18 just the way I want it. Okay?

19 A. Okay.

20 Q. If a price is set to produce a
21 revenue requirement different, a revenue requirement
22 different from what would result from prices set at
23 marginal cost, can it be said that that price is in
24 fact a marginal price within the definition of economic
25 efficiency discussed with counsel for Energy Probe?

1 A. Insofar as I can understand the
2 question phrased that way, the answer is no.

3 Q. Do you understand the question? I
4 will repeat it.

5 A. Well, I would look for -- you are
6 saying -- marginal cost price would produce some total
7 revenue. You are suggesting you set a price that
8 produces a different total revenue.

9 Q. Yes.

10 A. That therefore is not the marginal
11 cost price. You then said --

12 Q. Thank you.

13 A. Is that all you wanted? Fine.

14 THE CHAIRMAN: You are still free to
15 elaborate, even if it's own counsel. (Laughter)

16 MR. B. CAMPBELL: The Chairman is
17 absolutely correct.

18 Q. Mr. Burke, counsel for Energy Probe
19 referred you to a study under the initials G-A-I, I
20 don't know whether it was referred to on the transcript
21 as G-A-I or GAI study of elasticities amongst the
22 various other studies that were conducted, I believe.
23 The reference here, just again for purposes of the
24 record, can be found at Volume 11, page 1884. Energy
25 Probe subsequently supplied us with a copy of that

1 study. But on the stand, without having had an
2 opportunity to look at the study, you indicated that it
3 would be unlikely that it was a study which relied on
4 that it was a survey of elasticities which relied on
5 studies later than 1980.

6 Having now been provided with the study
7 by Energy Probe, have you had an opportunity to look at
8 that review of elasticity studies?

9 MR. BURKE: A. Yes, I have, but I don't
10 think I said studies after 1980. I said data after
11 1980.

12 Q. All right. Having had the
13 opportunity to review it, can you indicate whether or
14 not that study referred to by Energy Probe is based on
15 any data later than 1980?

16 A. The study was actually very good in
17 supplying for most of the references the data period
18 for the analysis, and only in two cases was there an
19 analysis done on data after 1980. One was a BC Hydro
20 study that went to 1981 or 2 and another one was an
21 Alberta cross-sectional study that used data in 1983
22 and '85, I believe.

23 But there were some studies for which no
24 data -- sort of time period was provided, and so I
25 can't comment on those.

1 Q. All right. Mr. Burke, you had a
2 discussion with Mr. Shepherd, and again this can be
3 found at Volume 11, page 1935, and I am going to read
4 you some excerpts from that discussion of the
5 uncertainty bands. The discussion with Mr. Shepherd at
6 that point was with respect to the width of the band in
7 2015, and he was asking questions regarding the adding
8 of 3,000 megawatts to the upper and lower end of the
9 distribution at the 80 per cent point.

10 Do you recall that discussion? I am
11 going to read a couple of excerpts. Perhaps you could
12 just turn it up.

13 A. Did you say page 1935?

14 Q. 1935.

15 A. Yes.

16 Q. There was some discussion as to
17 that's not that small an amount of capacity.

18 "ANSWER: You mean the extra amount of
19 uncertainty one has to take into account?

20 "QUESTION: Yes.

21 "ANSWER: In the tails?

22 "QUESTION: Yes."

23 And you go on to say:

24 "ANSWER: I can't answer that. I
25 think you will have to ask the planners

1 how much their plans are going to change
2 on the basis of adding 3,000 to the top
3 end or subtracting 3,000 from the bottom
4 end. You know, we are talking about the
5 extreme values of this distribution."

6 I want to direct your attention to those
7 words. And then you continue down. Mr. Shepherd
8 points out:

9 "QUESTION: Well, it isn't actual the
10 extreme values, is it? It is the 80 per
11 cent values, right? There is still a 10
12 per cent likelihood that it will be even
13 wider than this?

14 "ANSWER: Well, that's right, but I
15 think --

16 "QUESTION: On either end?

17 "ANSWER: Pardon me?

18 "QUESTION: On either end?

19 "ANSWER: That's right.

20 "QUESTION: In fact, at 20 per cent total
21 likelihood that it will be wider than
22 this?

23 "ANSWER: That's correct, but if you are
24 making a plan - and here I don't want to
25 step in the planner's toes - you are not

1 going to assign equal probability to all
2 points in the range."

3 Now, I would like to direct your
4 attention particularly to the two statements, "You
5 know, we are talking about the extreme values of this
6 distribution," and to the statement, "You are not going
7 to assign equal probability to all points in the
8 range," and ask you to explain, please, the point that
9 you are making there. The transcript then changes
10 topic at that point.

11 A. I guess what I was saying was that in
12 making a plan for the future, in selecting a single
13 plan, the likelihood is that the plan will reflect more
14 highly the outcomes close to the median where the
15 majority of the distribution lies and give less weight
16 to outcomes at -- well, at the lower and upper bound of
17 the range as we have defined it, the 80 per cent range.

18

19

20 ...

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1 [12:53 p.m.] Q. Thank you.

2 I then want to turn back to you, Mr.

3 Rothman, and this had to do with some questions in the
4 area of gas prices.

5 Again, I believe it relates to a question
6 from Mr. Shepherd, and that exchange can be found at
7 Volume 12, page 2104 of the transcript. And there, the
8 question was asked of you -- did I say page 2104?

9 THE CHAIRMAN: Yes.

10 MR. B. CAMPBELL: Okay. There, it is
11 asked of you:

12 "Is it fair to say that you have
13 overforecast natural gas prices" - I take
14 it to mean that it was if you have overforecast natural
15 gas prices - "the likely result is to depress
16 the amount of economic non-utility
17 generation? Is that something you would
18 expect to be the case?

19 ANSWER: If the non-utility generation
20 is gas fired, yes," was your answer.

21 Q. My question to you is: First, do you
22 have any familiarity with how Ontario Hydro's contracts
23 with non-utility generators deal with gas supply and
24 gas contracting requirements to support the non-utility
25 generation purchase?

1 MR. ROTHMAN: A. No detailed
2 familiarity, no. I mean, the non-utility generation
3 division is in my branch, so I talk to its director
4 occasionally, but I --

5 Q. I don't want to proceed further with
6 this unless you have some knowledge of it.

7 My question is: Do you have any
8 familiarity with how the contracts, the contracts
9 themselves --

10 A. No.

11 MR. B. CAMPBELL: Fine. Thank you. I
12 guess I cannot proceed on that.

13 And those are my questions in
14 re-examination, Mr. Chairman.

15 Although, perhaps not entirely
16 appropriate, at least two of these witnesses, at least,
17 believe that they will not be reappearing and I would
18 like to record, apart entirely from any judgments that
19 are made on the individual matters, that each of them
20 have dealt with - and I certainly include Mr. Burke in
21 this, as well - I think, the process.

22 The personal effort that these people
23 have put into the process, both in terms of answering -
24 in particular, answering interrogatories - and working
25 incredible hours to make that effort to have this

1 process start on time and meet the information requests
2 that have certainly, I think it is fair to say,
3 exceeded all our expectations has been phenomenal and I
4 would be remiss if I did not record that, as I say,
5 apart entirely from any arguments that we all may have
6 at the end of the day about where their evidence takes
7 the panel.

8 THE CHAIRMAN: Thank you, Mr. Campbell.

9 I think it would be not right for me to
10 comment on those last remarks.

11 MR. B. CAMPBELL: I fully agree, Mr.
12 Chairman. I neither ask for, nor expect any. I just
13 happen to know the work that they have put in to try
14 and assist the process generally and, quite frankly, I
15 think it should be recorded.

16 MS. PATTERSON: Well, we are happy you
17 are being nice to your witnesses now, Mr. Campbell.

18 (Laughter)

19 MR. B. CAMPBELL: They will tell you it
20 is the first time.

21 THE CHAIRMAN: I think I would like to
22 say that the first panel, which may not mean them, has
23 gone reasonably well and I think that, to a great
24 extent, is due to what I perceive to be the cooperation
25 amongst the Intervenors for which I am very grateful.

1 I think we all are.

2 And I suppose that a certain amount of
3 repetition and matters of that kind can't be avoided,
4 but I think we have done reasonably well on the first
5 panel.

6 ---Panel withdraws

7 We are now ready to proceed to the second
8 panel, which will start on Tuesday morning at ten
9 o'clock.

10 There is a list which I have received
11 from Mr. Shepherd, which I haven't got in front of me,
12 which indicates that the order of cross-examination has
13 been settled subject to perhaps one issue and that is
14 the same issue that came up with the last panel, and
15 that is the place in order of the Government of
16 Ontario.

17 Is that the understanding of those
18 parties who happen to be here at the moment? Have you
19 got the list?

20 The list that I have starts with the
21 Municipal Electric Association, followed by the
22 Association of Major Power Consumers, followed by
23 Energy Probe, followed by Independent Power Producers'
24 Society, South Bruce Economic Development Corporation,
25 Solar Energy Society of Canada, Ontario Natural Gas

1 Association, Coalition of Environmental Groups,
2 Northwatch, City of Toronto, Ontario Public Health
3 Association, Consumers' Association of Canada,
4 Northumberland Environmental Protection, Nishnawbe-Aski
5 Nation and others, Moose River/James Bay Coalition,
6 North Shore Tribal Council, Ontario Metis and
7 Aboriginal Association, Nipigon Aboriginal Peoples'
8 Association.

9 MR. B. CAMPBELL: Mr. Chairman, I think
10 you are losing the reporter.

11 THE CHAIRMAN: Oh, sorry. I can give
12 this list to the reporter -- Florence Mackesy, Ron
13 Hunter and Government Ministries and Agencies. That is
14 the list.

15 We are adjourned until Tuesday morning at
16 ten o'clock.

17 THE REGISTRAR: This hearing is adjourned
18 until Tuesday morning next at ten o'clock.

19 ---Whereupon the hearing was adjourned at 1:00 p.m.,
20 to be reconvened on Tuesday, the 21st day of May,
 1991, at 10:00 a.m.

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